

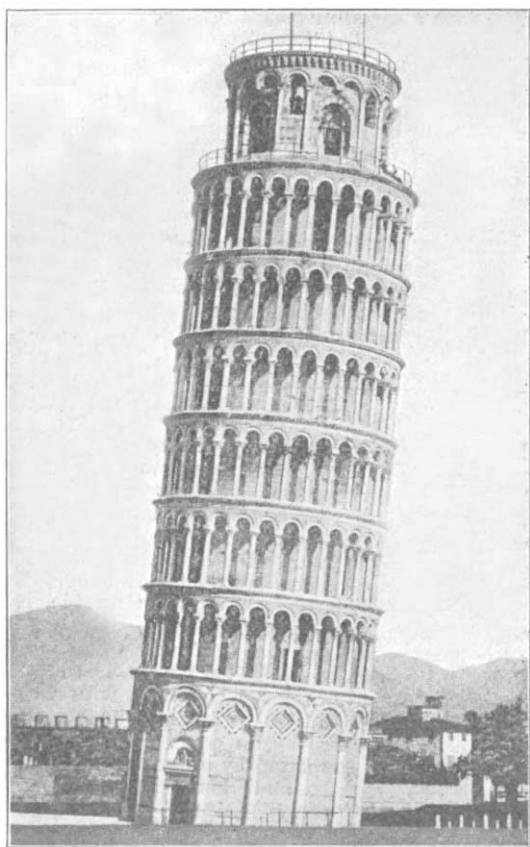
subsidence has gone on increasing in the last eighty years, and this serious conclusion has attracted the attention of competent authorities.

The investigations of the Commission have clearly brought out the following facts:—

(1) The tower does not rest on a mass of masonry extending over the whole area of the circular base, as was hitherto supposed, but is supported only by a more limited annulus of masonry corresponding to the cylindrical form of the superstructure.

(2) The foundations, hitherto supposed to be about 8 metres deep, are, on the contrary, much more superficial, and hardly sink to 3.60 metres below the level of the ground.

(3) A spring of water rises at the junction of the foundations with the surrounding permeable earth, causing serious damage to the foundations them-



The Leaning Tower of Pisa.

selves. A tank excavated near the tower in 1839 for the purpose of maintaining the surrounding basin dry and preserving the base in good condition was made very deep, and much below the level of the actual edge, thus collecting other waters, which were pumped out regardless of the safety of the tower.

(4) The slope of the tower, according to the measurements made in 1829 by Messrs. Cresy and Taylor, which may be regarded as correct, was, from the first to the seventh tier, 86.5 mm. per metre of height. The slope, as now determined by optical appliances by Prof. Pizzetti, and directly by the plumb-line by the engineers, Drs. Cuppari and Bernieri, is—again from the first to the seventh tier—92 mm. per metre. The slope has therefore increased $5\frac{1}{2}$ mm. per metre, and there is thus an external displacement of 2.868 metres, and a total deviation of the axis, from the first to the

seventh tier, of 3.265 metres, exceeding that found by the English observers in 1829 by nearly 20 centimetres.

The Commission has not been able to decide whether the increase in the leaning took place gradually or at intervals as the result of different causes. One such cause might be the excavation of the tank and the ill-advised pumping operations already mentioned; another might be sought in the effects of the earthquake of 1846, which was fairly violent at Pisa, and, as asserted by Leopoldo Pilla in his account of the times, caused the tower to oscillate in an alarming way. "Those people who had the opportunity of observing it during the shock," writes the great geologist, "assure me that its swaying was a terrible sight."

In spite of these serious conclusions, the Commission is nevertheless unanimously of opinion that the famous tower of Pisa still possesses good stability, and that the present condition of the same is not such as to give rise to excessive apprehension for the future.

A. BATTELLI.

RECENT BOOKS ON BOTANY.*

(1) MR. SCOTT ELLIOT has attempted an ambitious task, i.e. to give a popular and at the same time comprehensive account of modern botanical research. On the whole, he has been thoroughly successful, and has produced a readable book, which may well impress the layman or amateur botanist with the extent and scope of the botany of to-day. But (though this is perhaps inseparable from a work of this kind) one is almost bewildered by the rapidity with which the scene changes from the polar regions to the tropics, or the subject under discussion from, e.g., the effect of electricity on plants to the origin of the British flora. In the preface the author states that he is particularly interested in "open-air botany, the story of the conquest of the world by green vegetation," and it is when discussing topics of this kind that he appears at his best. Such descriptions as that of the soil, with its manifold complexities of life and structure, or of a "Chroolepus Forest" are distinctly good, even if a trifle exaggerated. The chapters on bacteria, Arctic and Alpine floras, and the re-conquest of the water are amongst the best in the book. In a few cases, however, Mr. Elliot has attempted the impossible. Thus, in a chapter on the fern alliance, he condenses into three octavo pages an account of the alternation of generations, Bower's theory of the origin of the fern sporophyte, the reduction of the gametophyte in flowering plants, and a description of the pteridosperms. The result can scarcely be other than to cause confusion in the mind of the non-botanist. In describing the growth of the living crust of mosses on the top of a sphagnum bog (p. 74), the author suggests that "these moss plants may, for aught we know to the contrary, be the identical individuals which perhaps began to grow there at the close of the Glacial period." This raises the interesting metaphysical problem of how far the conception of individuality is applicable to plants. Unfortunately, Mr. Elliot does not discuss the question, though he briefly refers to it again on p. 152. It is to be expected that some inaccuracies should creep into a book of this nature. A desire for brevity is probably responsible for the statement on p. 109 that the

* (1) "Botany of To-day: a Popular Account of Recent Notable Discoveries." By G. F. Scott Elliot. Pp. 352. (London: Seeley and Co., Ltd., 1910.) Price 5s. net.

(2) "The Book of Nature Study." Vol. v. Edited by Prof. J. B. Farmer. Pp. viii+224. (London: Caxton Publishing Co., n.d.)

(3) "A Text-book of Botany for Students, with Directions for Practical Work." By Amy F. M. Johnson. Pp. viii+535. (London: Allman and Sons, Ltd., n.d.) Price 7s. 6d.

pollen grains of a flower are male sperm cells; while the somewhat astounding information (p. 132) that the leaves of *Victoria Regia* may be 60 feet across is, of course, a mere slip, and not a traveller's tale. There are a number of beautiful photographs (chiefly of plants of economic importance), some of which, however, seem to have little reference to the matters discussed in the text. Similarly, "The First Land Plants," which is the title of chapter iii., scarcely describes its contents, which deal chiefly with soil and the nitrate supply of the vegetable world. One of the photographs is here reproduced.

(2) As other volumes of "The Book of Nature Study" have been reviewed in NATURE, it is unnecessary to indicate the general scope of this work. The first contribution to this volume is one by Miss C. L. Laurie, which (considering that it contains a chapter on aquatic vegetation, and another on that of meadows and pastures) bears the somewhat curious general title of "Xerophytic Vegetation." This part of the work contains a good deal of interesting information, and some useful suggestions for practical work; but, on the whole, it is rather disappointing. In many places there is a lack of clearness, both of expression and arrangement. On p. 15, for instance, it is stated that the amount of salt in the sea aster varies from 43-49 per cent. It is only incidentally mentioned in a later paragraph that this refers to ash analysis, and not to the fresh or dry weight of the plant. The editor might well have exercised a stricter supervision over these chapters.

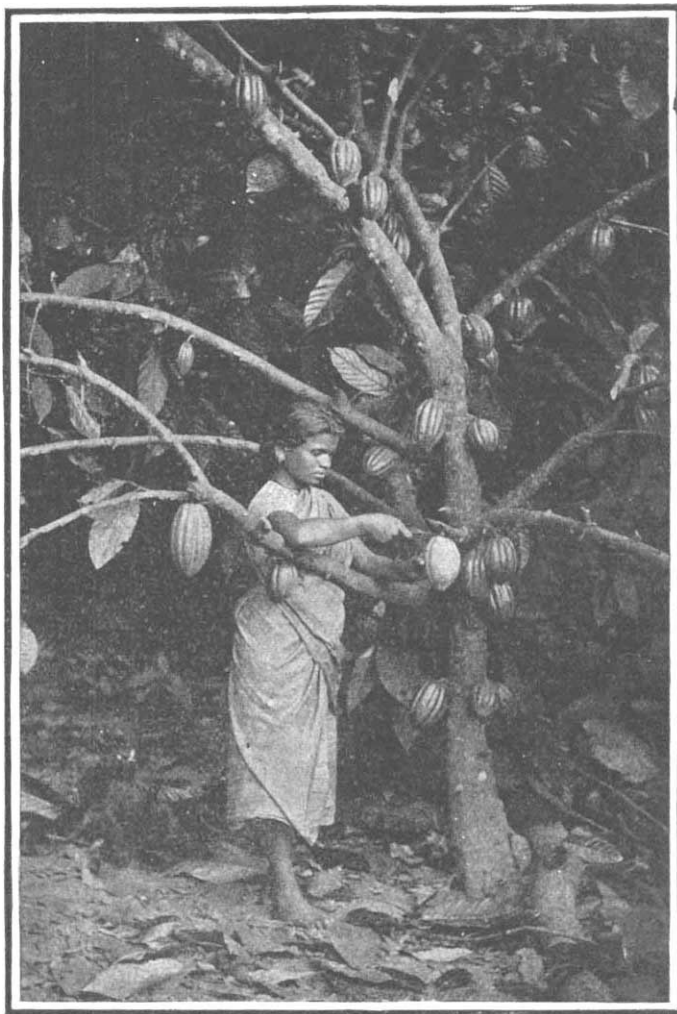
But the remainder of the volume is on a higher level. Chapters v.-xii. are devoted to "The School Garden," the author being Mr. J. E. Hennesey. The subject is treated almost entirely from a practical point of view, gardening operations of various kinds—tillage, manuring, the propagation and treatment of plants, &c.—being clearly described. These chapters should prove invaluable to amateur gardeners, and perhaps more particularly to teachers who have the oversight of a school garden. Mr. Hennesey rightly emphasises the importance of a garden being attached to at least every rural school. It is interesting to note that such gardens are increasing in number in England, though we are still far behind Austria-Hungary, in which more than 18,000 school gardens have been established since 1870.

Distinctly the best part of the present volume has been reserved to the last chapter, which contains a really excellent account of "The Work of the Soil," by Mr. A. D. Hall. The author first deals with the origin of soils, and then with their properties. Under the latter heading clear directions are given for conducting simple soil analysis, also for experiments to show the behaviour of different soils towards water, the work performed by soil organisms, &c. Pp. 209-11 contain a graphic and convincing description of the competition of plants in nature.

Both "The Book of Nature Study" and Mr. Scott Elliot's "Botany of To-day" are worthy of a place on the bookshelves of every school library.

(3) Miss Johnson has produced a carefully and, on the whole, a clearly written text-book, but, like many

other books of the kind, it is somewhat deficient in brightness and suggestiveness. In the opinion of the present writer, it is a mistake to adopt the water-tight compartment system in the teaching of elementary students. The author, however, adheres to the time-worn method of devoting entirely separate sections of her book to morphology, histology, and physiology. Thus the external characters, the structure, and the functions of a root are treated in quite different parts of the book. Further, bearing in mind the students for whom the work is intended (*vide* preface), it is somewhat overcrowded with unnecessary detail. The book is fairly free from serious errors, but perhaps it



[Photo.]

[Sheen and Co., Ceylon.
Plucking Cocoa Pods. From "Botany of To-day."]

may be worth while to direct attention to the fact that the intercellular passages so frequent in the vascular bundles of monocotyledons are not *air* cavities. Again, the *chief* function of the air spaces in the stems of water plants is scarcely to "give lightness to the plant" (p. 219), though, curiously enough, this statement is also made by Miss Laurie in "The Book of Nature Study" (p. 23), reviewed above. The excellent illustrations, which are nearly all new, form the best feature of the book. These are chiefly by Miss Boys-Smith and Miss Berridge.